

**REMARKS**

Claims 1-7 were examined and reported in the Office Action. Claims 1-7 are rejected. Claims 1-2 are amended. Claims 1-7 remain.

Applicants request reconsideration of the application in view of the following remarks.

**I. 35 U.S.C. §102**

A. It is asserted in the Office Action that claims 1-3, 6-7 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,998,258 issued to Melnick et al ("Melnick").

According to MPEP §2131, "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.' (Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)). 'The identical invention must be shown in as complete detail as is contained in the ... claim.' (Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)). The elements must be arranged as required by the claim, but this is not an ipsissimis verbis test, i.e., identity of terminology is not required. (In re Bond, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990))."

Applicant's amended claim 1 contains the limitations of "[a] method for fabricating a ferroelectric memory device, comprising the steps of: forming a first insulation layer on a substrate; forming a storage node contact contacting to a partial portion of the substrate by passing through the first insulation layer; forming a first conductive layer and a hard mask on the storage node contact on the first insulation layer, wherein the first conductive layer is patterned by using the hard mask, thereby obtaining a stack pattern; forming a second insulation layer on the stack pattern; planarizing the second insulation layer until a surface of the hard mask is exposed;

removing selectively the exposed hard mask to make a surface level of the lower electrode lower than that of the second insulation layer; and forming sequentially a ferroelectric layer and an upper electrode on the second insulation layer and the lower electrode.”

Melnick discloses a process for forming a lower capacitor electrode. In Melnick, the bottom electrode includes a barrier layer and an interfacial layer, wherein the barrier layer prevents the interfacial layer material from interacting with the contact region during a high temperature anneal process (See Melnick, column 3, lines 30-35). The interfacial layer corresponding to the hard mask of Applicant’s claimed invention provides appropriate capacitive properties for the bottom electrode. Therefore, the use of an interfacial layer, which minimizes the amount of dielectric dispersion, is advantageous. In Melnick, examples of such interfacial layers would include platinum and palladium (See Melnick, column 3, lines 45-56). Distinguishable, the hard mask of Applicant’s claimed invention is used for a mask to pattern the first conductive layer into a bottom electrode (See Applicant’s specification, page 9, lines 23-26). And, the hard mask is made of TiN or TaN by using a CVD technique as claimed (See Applicant’s specification, page 9, lines 13-16).

Additionally, the hard mask pattern is removed so the surface of the lower electrode becomes lower than that of the second insulation layer before a ferroelectric layer is deposited (See Applicant’s specification, page 11, lines 19-26). On the other hand, the interfacial layer of Melnick remains on the barrier layer to minimize the amount of dielectric dispersion (See Melnick, column 3, lines 30-35). Applicant’s claimed invention further discloses and claims selectively removing the exposed hard mask to make a surface level of the lower electrode lower than that of the second insulation layer. Melnick, however, cannot remove the interfacial layer since it plays the role of minimizing the amount of dielectric dispersion (See Melnick, column 3, lines 30-35). Therefore, Applicant’s claimed invention is clearly distinguishable from that of Melnick.

Therefore, since Melnick does not disclose, teach or suggest all of Applicant’s

claim 1 limitations, Applicant respectfully asserts that a *prima facie* rejection under 35 U.S.C. § 102(b) has not been adequately set forth relative to Melnick. Thus, Applicant's claim 1 is not anticipated by Melnick. Additionally, the claims that directly or indirectly depend on claim 1, namely claims 2-3 and 6-7, are also not anticipated by Melnick for the same reason.

Accordingly, withdrawal of the 35 U.S.C. §102 (b) rejections for claims 1-3, 6-7 are respectfully requested.

**B.** It is asserted in the Office Action that claims 1, 3 and 7 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,843,830 issued to Graettinger et al ("Graettinger ").

Graettinger discloses a method for forming a capacitor. In Graettinger's method, although the oxidation barrier layer corresponding to a hard mask is disclosed, it is distinguishable from the hard mask of Applicant's claimed invention. That is, the oxidation layer of Graettinger is formed after the patterned inner capacitor plate layer so as to function as a barrier layer at the sidewalls of the inner capacitor plate (See Graettinger, column 4, lines 53-64). The hard mask of Applicant's claimed invention is formed before the patterning of a bottom electrode. More specifically, the hard mask of the Applicant's claimed invention serves as a mask to pattern the first conductive layer into a bottom electrode (See Applicant's specification, page 9, lines 23-26).

Therefore, since Graettinger does not disclose, teach or suggest all of Applicant's claim 1 limitations, Applicant respectfully asserts that a *prima facie* rejection under 35 U.S.C. § 102(b) has not been adequately set forth relative to Graettinger. Thus, Applicant's claim 1 is not anticipated by Graettinger. Additionally, the claims that directly or indirectly depend on claim 1, namely claims 3 and 7, are also not anticipated by Graettinger for the same reason.

Accordingly, withdrawal of the 35 U.S.C. §102 (b) rejections for claims 1, 3 and 7 are respectfully requested.

## II. 35 U.S.C. § 103

A. It is asserted in the Office Action that claim 4 is rejected in the Office Action under 35 U.S.C. § 103(a), as being unpatentable over U. S. Patent No. 5,998,258 issued to Melnick in view of U.S. Publication No. 2002/0045344 to Wang et al. ("Wang"), or U. S. Patent No. 6,225,202 issued to Gupta et al. ("Gupta"). Applicant respectfully traverses the aforementioned rejection for the following reasons.

According to MPEP §2142 "[t]o establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." (*In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)). Further, according to MPEP §2143.03, "[t]o establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. (*In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)." "*All words in a claim must be considered* in judging the patentability of that claim against the prior art." (*In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970), emphasis added.)

Applicant's claim 4 indirectly depends on claim 1. Applicant has addressed claim 1 regarding Melnick above in section I(A).

Wang discloses a method of forming a polycrystalline cobaltsilicide or similar near noble silicide on a silicon substrate. Gupta discloses a method for removing unreacted nickel of cobalt after silicidation using carbon monoxide dry stripping. Neither Melnick, Wang, Gupta, and therefore the combination of any two, do not teach, disclose or suggest that a hard mask is used for a mask to pattern a first conductive layer into a bottom electrode, the hard mask is made of TiN or TaN by using a CVD technique, nor selectively removing the exposed hard mask to make a surface level of

the lower electrode lower than that of the second insulation layer.

Since neither Melnick, Wang, Gupta nor any combination of the three, teach, disclose or suggest all the limitations of Applicant's claim 1, as listed above, there would not be any motivation to arrive at Applicant's claimed invention. Thus, Applicant's claim 1 is not obvious over Melnick in view of Wang or Gupta since a *prima facie* case of obviousness has not been met under MPEP §2142. Additionally, the claim that indirectly depends from claim 1, namely claim 4, would also not be obvious over Melnick in view of Wang or Gupta for the same reason.

Accordingly, withdrawal of the 35 U.S.C. § 103(a) rejections for claim 4 is respectfully requested.

**B.** It is asserted in the Office Action that claim 5 is rejected in the Office Action under 35 U.S.C. § 103(a), as being unpatentable over Melnick, in view of U.S. Patent No. 6,610,597 issued to Kobayashi ("Kobayashi") or Gupta. Applicant respectfully traverses the aforementioned rejection for the following reasons.

Applicant's claim 5 indirectly depends on claim 1. Applicant has addressed claim 1 regarding Melnick above in section I(A).

Kobayashi discloses a process to form a contact structure with a tungsten plug. Gupta discloses a method for removing unreacted nickel of cobalt after silicidation using carbon monoxide dry stripping. Neither Melnick, Kobayashi, Gupta, and therefore the combination of any two, do not teach, disclose or suggest that a hard mask is used for a mask to pattern a first conductive layer into a bottom electrode, the hard mask is made of TiN or TaN by using a CVD technique, nor selectively removing the exposed hard mask to make a surface level of the lower electrode lower than that of the second insulation layer.

Since neither Melnick, Kobayashi, Gupta nor any combination of the three, teach, disclose or suggest all the limitations of Applicant's claim 1, as listed above, there would not be any motivation to arrive at Applicant's claimed invention. Thus,

Applicant's claim 1 is not obvious over Melnick in view of Kobayashi or Gupta since a *prima facie* case of obviousness has not been met under MPEP §2142. Additionally, the claim that indirectly depends from claim 1, namely claim 5, would also not be obvious over Melnick in view of Kobayashi or Gupta for the same reason.

Accordingly, withdrawal of the 35 U.S.C. § 103(a) rejection for claim 5 is respectfully requested.

C. It is asserted in the Office Action that claim 2 is rejected in the Office Action under 35 U.S.C. § 103(a), as being unpatentable over U. S. Patent No. 5,843,830 issued to Graettinger, in view of U.S. Patent No. 5,786,259 issued to Kang ("Kang"). Applicant respectfully traverses the aforementioned rejection for the following reasons.

Applicant's claim 2 directly depends on claim 1. Applicant has addressed claim 1 regarding Graettinger above in section I(B).

Kang discloses a fabrication process for a ferroelectric random access memory (FRAM) with ultrasonic treatment, BC technology and special cleaning technology. Neither Graettinger, Kang, and therefore the combination of the two, do not teach, disclose or suggest that the hard mask of the Applicant's claimed invention serves as a mask to pattern the first conductive layer into a bottom electrode.

Since neither Graettinger, Kang, nor the combination of the two, teach, disclose or suggest all the limitations of Applicant's claim 1, as listed above, there would not be any motivation to arrive at Applicant's claimed invention. Thus, Applicant's claim 1 is not obvious over Graettinger in view of Kang since a *prima facie* case of obviousness has not been met under MPEP §2142. Additionally, the claim that directly depends from claim 1, namely claim 2, would also not be obvious over Graettinger in view of Kang for the same reason.

Accordingly, withdrawal of the 35 U.S.C. § 103(a) rejections for claim 2 is respectfully requested.

D. It is asserted in the Office Action that claim 4 is rejected in the Office Action under 35 U.S.C. § 103(a), as being unpatentable over Graettinger, in view of Wang or Gupta. Applicant respectfully traverses the aforementioned rejection for the following reasons.

Applicant's claim 4 indirectly depends on claim 1. Applicant has addressed claim 1 regarding Graettinger above in section I(B).

Wang discloses a method of forming a polycrystalline cobaltsilicide or similar near noble silicide on a silicon substrate. Gupta discloses a method for removing unreacted nickel of cobalt after silicidation using carbon monoxide dry stripping. Neither Graettinger, Wang, Gupta, and therefore the combination of any two, do not teach, disclose or suggest that the hard mask of the Applicant's claimed invention serves as a mask to pattern the first conductive layer into a bottom electrode.

Since neither Graettinger, Wang, Gupta, nor the combination of any two, teach, disclose or suggest all the limitations of Applicant's claim 1, as listed above, there would not be any motivation to arrive at Applicant's claimed invention. Thus, Applicant's claim 1 is not obvious over Graettinger in view of Wang or Gupta since a *prima facie* case of obviousness has not been met under MPEP §2142. Additionally, the claim that indirectly depends from claim 1, namely claim 4, would also not be obvious over Graettinger in view of Wang or Gupta for the same reason.

Accordingly, withdrawal of the 35 U.S.C. § 103(a) rejection for claim 4 is respectfully requested.

E. It is asserted in the Office Action that claim 5 is rejected in the Office Action under 35 U.S.C. § 103(a), as being unpatentable over Graettinger, in view of Kobayashi or Gupta. Applicant respectfully traverses the aforementioned rejection for the following reasons.

Applicant's claim 5 indirectly depends on claim 1. Applicant has addressed claim 1 regarding Graettinger above in section I(B).

Kobayashi discloses a process to form a contact structure with a tungsten plug. Gupta discloses a method for removing unreacted nickel of cobalt after silicidation using carbon monoxide dry stripping. Neither Graettinger, Kobayashi, Gupta, and therefore the combination of any two, do not teach, disclose or suggest that the hard mask of the Applicant's claimed invention serves as a mask to pattern the first conductive layer into a bottom electrode.

Since neither Graettinger, Kobayashi, Gupta, nor the combination of any two, teach, disclose or suggest all the limitations of Applicant's claim 1, as listed above, there would not be any motivation to arrive at Applicant's claimed invention. Thus, Applicant's claim 1 is not obvious over Graettinger in view of Kobayashi or Gupta since a *prima facie* case of obviousness has not been met under MPEP §2142. Additionally, the claim that indirectly depends from claim 1, namely claim 5, would also not be obvious over Graettinger in view of Kobayashi or Gupta for the same reason.

Accordingly, withdrawal of the 35 U.S.C. § 103(a) rejections for claim 5 is respectfully requested.

F. It is asserted in the Office Action that claim 6 is rejected in the Office Action under 35 U.S.C. § 103(a), as being unpatentable over Graettinger, in view of U. S. Publication No. 2004/0053466 to Mikawa et al. ("Mikawa"). Applicant respectfully traverses the aforementioned rejection for the following reasons.

Applicant's claim 6 indirectly depends on claim 1. Applicant has addressed claim 1 regarding Graettinger above in section I(B).

Mikawa discloses a method for manufacturing a semiconductor device by forming a conductive layer over an insulating layer and over contact plugs, forming capacitor element lower electrodes by patterning the conductive layer, forming another insulating layer, forming recesses in the second insulating layer at a region above the capacitor element lower electrodes, planarizing the second insulating layer to expose the capacitor lower electrodes. Neither Graettinger, Mikawa, and therefore the combination of the two, do not teach, disclose or suggest that the hard mask of the



Applicant's claimed invention serves as a mask to pattern the first conductive layer into a bottom electrode.

Since neither Graettinger, Mikawa, nor the combination of the two, teach, disclose or suggest all the limitations of Applicant's claim 1, as listed above, there would not be any motivation to arrive at Applicant's claimed invention. Thus, Applicant's claim 1 is not obvious over Graettinger in view of Mikawa since a *prima facie* case of obviousness has not been met under MPEP §2142. Additionally, the claim that indirectly depends from claim 1, namely claim 6, would also not be obvious over Graettinger in view of Mikawa for the same reason.

Accordingly, withdrawal of the 35 U.S.C. § 103(a) rejections for claim 6 is respectfully requested.

**CONCLUSION**

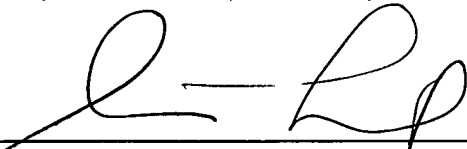
In view of the foregoing, it is believed that all claims now pending, namely 1-7, patentably define the subject invention over the prior art of record and are in condition for allowance and such action is earnestly solicited at the earliest possible date.

If necessary, the Commissioner is hereby authorized in this, concurrent and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2666 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17, particularly extension of time fees. If a telephone interview would expedite the prosecution of this Application, the Examiner is invited to contact the undersigned at (310) 207-3800.

Respectfully submitted,

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